Remote Sensing for Pest Management

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Content

- 1. What is remote sensing?
- 2. Field level patterns
- 3. Principles of pest detection with remote sensing
- 4. Current and upcoming technology



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Remote Sensing

The application of sensing technology to capture areas of interest in a way that lends itself to mapping of what is being observed.







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Persistance of perennials







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Seedbank with localized dispersal



Late summer seed drop



Seed germination







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generic bare ground patch





diagnostic spectral patch















Principles of pest detection with remote sensing



Aerial 1 cm GSD

Satellite 50 cm GSD

Satellite 100 cm GSD

Satellite 1000 cm GSD









Red

Green









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source: esa.int

Hberta

NIR

Red







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Pixel Classification

- Unsupervised: groupings are based on a natural or forced clustering of the data, without prior knowledge of the what the clusters represent.
- Supervised: groupings are based on the spectral characteristics of known features.





Feature Recognition

- Object Based Image Analysis (OBIA)
 - Segmentation
 - Object classification / extraction
- Convolutional Neural Networks
 - identifies content of a scene
 - requires large training data set
 - computational intensive



Diagnosing the Problem



Application Technology



Technology for spot treatment application

Pulse width modulation

- responds to speed variations
- prevents overlap
- maintains buffer distance
- integration with spot treatment maps



Technology for spot treatment application

Real time detection

- Pre-seed, Pre-emerge
 - WeedIT, Weed Seeker, Trimble
- In-crop
 - Agrifac AiCplus, Kuhn I-Spray, Blue River
- Drawbacks
 - \$\$\$
 - not suitable for monitoring





Spray drones



Remote Sensing Services

- Image libraries
 - Planet, L3Harris Geospatial, Maxar, ESA Sentinel Hub, USGS Earth Explorer
- Aerial Imagery
 - TerrAvion, Deveron, Skymatics, Green Aero Tech
- Cloud based analysis tools
 - Fieldview, FieldX, Farmers Edge, TerrAvion, …



In Conclusion

- 1. Remote Sensing can direct field scouting.
- 2. Detection of some types of pests is feasible in principle.
- 3. Algorithms for pest diagnosis need to be developed.
- 4. Applications will be driven by new hardware developments.





